AMENDMENTS TO THE SPECIFICATION

Please replace Paragraphs [0012] through [0013] with the following paragraphs rewritten in amendment format:

[0012] According to one aspect of the present invention, a first compact self-ballasted electrodeless discharge lamp includes a bulb filled with discharge gas containing mercury and a rare gas; an excitation coil installed near the bulb; a ballast circuit which supplies high frequency power to the excitation coil; and a base that is electrically connected to the ballast circuit, and in this structure, the bulb, the excitation coil, the ballast circuit and the base are formed into an integral part; the bulb has a virtually spherical shape or a virtually ellipsoidal shape; a recessed portion to which the excitation coil is inserted is formed on the ballast circuit side of the bulb; the recessed portion has an opening section on the ballast circuit side, and has a tube shape with a virtually round shape in its cross section, with a portion positioned on the side opposite to the opening section of the recessed portion being provided with a function for suppressing the convection of the discharge gas; the largest diameter of the bulb is set in a range from not less than 60 mm to not more than 90 mm; the bulb wall loading of the bulb during a stable lighting operation is set in a range from not less than 0.07 W/cm^2 to not more than 0.11 W/cm^2; the ratio (h/D) of the height (h) of the bulb based upon the end face of the opening section in the recessed portion to the largest diameter (D) of the bulb is set in a range from not less than 1.0 to not more than 1.3; and, supposing that a distance between a top face of the recessed portion positioned on the side opposite to the opening section of the

recessed portion and a top portion of the bulb facing the top face of the recessed portion is Δh, and that a diameter of a portion positioned on the side opposite to the opening section of the recessed portion is Dc, the following relationship is satisfied: $\Delta h \leq 1.15 \times Dc + 1.25$ ~~[mm]~~ --mm--.

[0013] In one embodiment of the present invention, the above-mentioned diameter Dc and the above-mentioned distance Δh satisfy the following relationship: $\Delta h \geq 1.16 \times Dc - 17.4$ ~~[mm]~~ --mm--.

Please replace Paragraphs [0016] and [0017] with the following paragraphs rewritten in amendment format:

[0016] According to another aspect of the present invention, a second compact self-ballasted electrodeless discharge lamp includes a bulb filled with discharge gas containing mercury and a rare gas; an excitation coil installed near the bulb; a ballast circuit which supplies high frequency power to the excitation coil; and a base that is electrically connected to the ballast circuit, and in this structure, the bulb, the excitation coil, the ballast circuit and the base are formed into an integral part; the bulb has a virtually spherical shape or a virtually ellipsoidal shape; a recessed portion to which the excitation coil is inserted is formed on the ballast circuit side of the bulb; the recessed portion has an opening section on the ballast circuit side, and has a tube shape with a virtually round shape in its cross section, with a portion positioned on the side opposite to the opening section of the recessed portion being provided with a function for suppressing the

convection of the discharge gas; the largest diameter of the bulb is set in a range from not less than 55 mm to not more than 75 mm; the bulb wall loading of the bulb during a stable lighting operation is set in a range from not less than 0.05 W/cm2 to less than 0.07 W/cm2; the ratio (h/D) of the height (h) of the bulb based upon the end face of the opening section in the recessed portion to the largest diameter (D) of the bulb is set in a range from not less than 1.0 to not more than 1.3; and, supposing that a distance between a top face of the recessed portion positioned on the side opposite to the opening section of the recessed portion and a top portion of the bulb facing the top face of the recessed portion is Δh, and that a diameter of a portion positioned on the side opposite to the opening section of the recessed portion is Dc, the following relationship is satisfied: $\Delta h \leq 1.92 \times Dc - 22.4$ ~~[mm]~~ --mm--.

[0017] In one embodiment of the present invention, the above-mentioned diameter Dc and the above-mentioned distance Δh satisfy the following relationship: $\Delta h \geq 1.16 \times Dc - 17.4$ ~~[mm]~~ --mm--.

Please replace Paragraphs [0023] and [0024] with the following paragraphs rewritten in amendment format:

[0023] A first electrodeless-discharge-lamp lighting device in accordance with the present invention includes a bulb that is filled with discharge gas containing mercury and a rare gas, and has a recessed portion; an excitation coil inserted in the recessed portion; and a ballast circuit which supplies high frequency power to the excitation coil, and in this

structure, the bulb has a virtually spherical shape or a virtually ellipsoidal shape; the recessed portion has an opening section on the ballast circuit side, and has a tube shape with a virtually round shape in its cross section; the largest diameter of the bulb is set in a range from not less than 60 mm to not more than 90 mm; the bulb wall loading of the bulb during a stable lighting operation is set in a range from not less than 0.07 W/cm2 to not more than 0.11 W/cm2; the ratio (h/D) of the height (h) of the bulb based upon the end face of the opening section in the recessed portion to the largest diameter (D) of the bulb is set in a range from not less than 1.0 to not more than 1.3; and, supposing that a distance between a top face of the recessed portion positioned on the side opposite to the opening section of the recessed portion and a top portion of the bulb facing the top face of the recessed portion is Δh, and that a diameter of a portion positioned on the side opposite to the opening section of the recessed portion is Dc, the following relationship is satisfied: Δh ≤ 1.15 × Dc + 1.25 ~~[mm]~~ --mm--.

[0024] According to the other aspect of the present invention, a second electrodeless-discharge-lamp lighting device includes a bulb that is filled with discharge gas containing mercury and a rare gas, and has a recessed portion; an excitation coil inserted in the recessed portion; and a ballast circuit which supplies high frequency power to the excitation coil, and in this structure, the bulb has a virtually spherical shape or a virtually ellipsoidal shape; the recessed portion has an opening section on the ballast circuit side, and has a virtually cylinder shape with a virtually round tube shape in its cross section; the largest diameter of the bulb is set in a range from not less than 55 mm to not more than 75 mm; the bulb wall loading of the bulb during a stable lighting operation is set

in a range from not less than 0.05 W/cm2 to less than 0.07 W/cm2; the ratio (h/D) of the height (h) of the bulb based upon the end face of the opening section in the recessed portion to the largest diameter (D) of the bulb is set in a range from not less than 1.0 to not more than 1.3; and, supposing that a distance between a top face of the recessed portion positioned on the side opposite to the opening section of the recessed portion and a top portion of the bulb facing the top face of the recessed portion is Δh, and that a diameter of a portion positioned on the side opposite to the opening section of the recessed portion is Dc, the following relationship is satisfied: $\Delta h \leq 1.92 \times Dc - 22.4$ ~~[mm]~~ --mm--.

Please replace Paragraph [0056] with the following paragraph rewritten in amendment format:

[0056] When, based upon FIG. 4, an area that can set the coldest point temperature to not more than 46°C is expressed as a relationship between Dc and Δh, the area corresponds to an area located below the relationship indicated by the dotted line of FIG. 6, and is represented by the following expression:

$\Delta h \leq 1.15 \times Dc + 1.25$ ~~[mm]~~ --mm--.

Please replace Paragraph [0061] with the following paragraph rewritten in amendment format:

[0061] The solid line of FIG. 6 shows an area that can set the contrast value to not more than 0.7 as a relationship between Δh and Dc, and an area above this line makes it possible to suppress the influence of the outline shadow of the recessed portion 102 to a minimum level. This area is represented by the following expression:

$\Delta h \geq 1.16 \times Dc - 17.4$ ~~[mm]~~ --mm--.

Please replace Paragraphs [0065] through [0067] with the following paragraphs rewritten in amendment format:

[0065] FIG. 11, which shows the results of computer simulation carried out on gas flows inside the bulb 101, is a drawing that shows one-half of the longitudinal cross-section of the bulb 101. The flows of gas are indicated by arrows. With respect to the distance ΔC ~~[mm]~~ --mm-- between the center portion 112 in the longitudinal direction of the winding face of the excitation coil 105 and the largest diameter portion 114 of the bulb 101, the side proceeding from the largest diameter portion 114 toward the base side is defined as the minus side. In this figure, ΔC = –8 ~~[mm]~~ --mm--. As clearly shown by the figure, the gas flows form a vertex centered on a portion that is located in the middle of the recessed portion 102 and the bulb 101, and corresponds to the largest diameter portion 114 of the bulb 101. These flows proceed toward the housing 201 along the recessed portion 102, turn toward the inner wall side of the bulb 101 from the recessed portion 102 at a corner on which the housing 201 overlaps the bulb 101, and then proceed toward the top portion (coldest point) of the bulb 101 along the inner wall of the bulb 101. The flows

turn toward the recessed portion 102 from the inner wall of the bulb 101 at a corner corresponding to the top of the recessed portion 102, and then proceed toward the housing 201 side again along the recessed portion 102.

[0066] In this case, in FIG. 11, since Dc and Δh satisfy the following relationship: $\Delta h \leq 1.15 \times Dc + 1.25$ ~~[mm]~~ --mm--, the gas flows do not enter an area 116 located between the top of the recessed portion 102 and the top portion of the bulb 101. In other words, the flows of the high-temperature gas are not allowed to reach the coldest point so that the effect of convection control by the recessed portion 102 is properly exerted.

[0067] The above-mentioned simulation relates to the gas flow, and in a separate manner from this, in order to find out a plasma generation position having the best light-emitting efficiency in accordance with the above-mentioned assumption, experiments were carried out, with the winding position of the excitation coil 105 to the magnetic core 106 being changed in various manners. As a result, the relationship shown in FIG. 9 was obtained between the distance ΔC from the center portion 112 in the longitudinal direction of the winding face of the excitation coil 105 to the largest diameter portion 114 of the bulb 101 and the entire luminous flux of the lamp. As clearly indicated by this figure, when ΔC is in a range from –8 to –30 mm, it is possible to obtain desirable light-emitting efficiency that causes no problems in practical use. When ΔC is in a range from –12 to –16 mm, the light-emitting efficiency becomes greater, which is preferable, and when ΔC is –14 mm, the luminous flux becomes the greatest and the light-emitting efficiency becomes best, which is more preferable. Here, different from the above-mentioned assumption, the reason why luminous flux does not become greatest in the

case of $\Delta C = 0$ ~~[mm]~~ --mm-- is that, when the center of the winding position of the excitation coil comes closer to the coldest point due to an increased value of ΔC greater than −14 mm, the high-temperature gas approaches the coldest point to cause a temperature rise in the coldest point because of a great bulb wall loading, resulting in degradation in the efficiency. Since the relationships between Dc and Δh as well as the winding position of the excitation coil 105 onto the magnetic core 106, which have not been taken into consideration conventionally, are taken into consideration so as to optimize the efficiency, the winding position of the excitation coil 105 onto the magnetic core 106 is shifted toward the minus side from the largest diameter portion 114 of the bulb 101.

Please replace Paragraphs [0070] and [0071] with the following paragraphs rewritten in amendment format:

[0070] In the same manner as the lamp of the high-watt type, experiments were also carried out on those of the low-watt type so as to examine the cold point temperature and the influence of the outline shadow of the recessed portion 102 at the top portion of the bulb 101, as well as the relationship between Δh and Dc. The resulting desirable range of Δh and Dc corresponds to an area sandwiched by two straight lines in FIG. 7. Here, since the detailed explanation of FIG. 7 is the same as that of FIG. 6, it is omitted in this case. A desirable relationship between Δh and Dc, obtained from this figure, is represented by the following expressions:

$\Delta h \leq 1.92 \times Dc - 22.4$ ~~[mm]~~ --mm--,

and

$\Delta h \geq 1.16 \times Dc - 17.4$ ~~[mm]~~ --mm--.

[0071] Moreover, experiments were carried out, with the winding position of the excitation coil 105 onto the magnetic core 106 being changed in various manners; thus, the relationship shown in FIG. 10 was obtained between the distance ΔC from the center portion 112 in the longitudinal direction of the winding face of the excitation coil 105 to the largest diameter portion 114 of the bulb 101 and the entire luminous flux of the lamp. As clearly indicated by this figure, when ΔC is set to virtually 0 mm, the luminous flux becomes the greatest and the light-emitting efficiency becomes best, which is preferable. Here, in the case of the lamp of the low-watt type, different from the lamp of the high-watt type, since the bulb wall loading is smaller, the luminous flux becomes the greatest, when ΔC = 0 ~~[mm]~~ --mm--.

Please replace Paragraph [0075] with the following paragraph rewritten in amendment format:

[0075] In this example, the largest diameter (D) of the bulb 101 is 70 mm, the height (h) of the bulb 101 measured from the opening end 103 of the recessed portion 102 is 80 mm, the diameter Dc of the recessed portion 102 is 23 mm, and Δh is 15 mm; thus, this structure is located in the area between the two straight lines, shown in FIG. 6, that have been described earlier. In other words, the following relationships are satisfied:

$\Delta h \leq 1.15 \times Dc + 1.25$ ~~[mm]~~ --mm--,

and

$\Delta h \geq 1.16 \times Dc - 17.4$ ~~[mm]~~ --mm--.

Consequently, it becomes possible to suppress the coldest point temperature to not more than 46°C, while reducing the influence of the outline shadow of the recessed portion 102 to a minimum. Here, since the recessed portion 102 has a virtually cylinder shape, virtually the same diameter is obtained at any portion in the recessed direction, and the diameter of the portion positioned on the side opposite to the opening section of the recessed portion 102 is also 23 mm. Moreover, the distance ΔC from the center portion in the longitudinal direction of the winding face of the excitation coil 105 of the magnetic core 106 to the largest diameter portion of the bulb 101 is set in a range from –14 mm ±2 mm, more preferably, from –14 mm ±1 mm; thus, it becomes possible to increase the light-emitting efficiency, with the coldest point temperature and the resistance of plasma being controlled in a well-balanced manner.

Please replace Paragraph [0078] with the following paragraph rewritten in amendment format:

[0078] In the present embodiment, the diameter Dc of the recessed portion 102 is 21 mm, and Δh is 12 mm; thus, this structure is located in the area between the two straight lines, shown in FIG. 7. In other words, the following relationships are satisfied:

$\Delta h \leq 1.92 \times Dc - 22.4$ ~~[mm]~~ --mm--,

and

$\Delta h \geq 1.16 \times Dc - 17.4$ ~~[mm]~~ --mm--.

Consequently, it becomes possible to suppress the coldest point temperature to not more than 45°C, while reducing the influence of the outline shadow of the recessed portion 102 to a minimum. Moreover, the distance ΔC from the center portion in the longitudinal direction of the winding face of the excitation coil 105 of the magnetic core 106 to the largest diameter portion of the bulb 101 is set in a range from 0 mm ±2 mm, more preferably, from 0 mm ±1 mm. In other words, since the bulb wall loading is smaller in comparison with the lamp for use in 100 W, it becomes possible to desirably control the coldest point temperature at a position of ΔC = 0 mm where the resistance of plasma is minimized, and consequently to increase the light-emitting efficiency.